VIOT
Modular Modem Communication Gateway

1. Features

- 4G LTE Cat 1 / 2G GPRS-EDGE with automatic fallback
- Physical SIM and embedded SIM/eSIM; automatic SIM switching
- 10+ smart meters through one or two RS-485 interfaces
- IEC 62056-21 Mode C; DLMS/COSEM software library
- MQTT 5.0 / TCP/IP; IPv4 and IPv6 connectivity
- MQTT over TLS 1.3; AES-256 payload encryption, ECDHE key agreement and LZ data compression
- External NOR Flash: offline storage and store-and-forward
- CRON schedules, directives, logs and alarms
- Remote FOTA/OTA with recovery rollback
- USB-C/RS485 local mobile-application management

2. Applications

- Smart Metering and Advanced Metering Infrastructure (AMI)
- Utility Meter Data Collection Systems
- Commercial and Industrial Energy Monitoring
- Multi-Meter Installations
- Remote Electricity Metering Infrastructure

3. Description

VIOT is a modular communication gateway for smart electricity meters. It connects a Head-End system to RS-485 meter networks through 4G LTE Cat 1 or 2G cellular communication, and supports more than ten meters per gateway.

Its application layer provides scheduled readouts, directives, data packaging and acknowledgement/retry handling. When connectivity is unavailable, acquired records can be retained in external NOR Flash and replayed after reconnection, subject to available storage capacity.

VIOT supports secure MQTT over TLS 1.3, request-selected AES-256 payload encryption and LZ compression, ECDHE key agreement, remote firmware updates with rollback, and local servicing through USB-C or RS-485.

Device Information

Part Number	RS485	Backup
VIOT-U11B-128	1	Battery
VIOT-U11C-128	1	2 × 10 F supercapacitors
VIOT-U20C-128	2	2 × 10 F supercapacitors
VIOT-U10C-128	1	2 × 10 F supercapacitors

Current assembled variants use 128 MB NOR Flash. 32 MB and 64 MB are available by order.

Table of Contents

1. Features.....1
2. Applications.....1
3. Description.....1
4. Pin Configuration and Functions.....3
4.1. Physical Interface Overview.....3
4.2. Power and Digital Input.....3
4.3. RS-485 and Relay Terminals.....3
4.4. USB-C, SIM and Antenna Interfaces.....3
5. Specifications.....3
5.1. Recommended Operating Conditions.....3
5.2. Cellular and Network Characteristics.....3
5.3. Smart Meter Interface and Readout.....4
5.4. Data Management and Scheduling.....4
5.5. Secure Communication and Cryptography.....4
5.6. Firmware and Local Device Management.....4
5.7. Front-Panel Indicators.....4
5.8. Testing and Certification Documentation.....5
6. Model Configurations and Ordering Information.....5
6.1. Product Code Structure.....5
7. Technical Drawings and Product Visuals.....6

4. Pin Configuration and Functions

4.1. Physical Interface Overview

Connector arrangement is model-dependent. Terminal assignments and supported physical interfaces are listed below.

4.2. Power and Digital Input

Interface	Function	Models
12 V DC input	12 V ±10% power supply	All
DRY CONTACT	1 digital input; closed=1, open=0	All

4.3. RS-485 and Relay Terminals

Interface	Function	Models
RS485 (I) A/B	Meter bus, half-duplex serial communications	All
RS485 (II) A/B	Second independent RS-485 interface	U20C
RELAY COM/NC	Latching relay contacts; 240 VAC / 5 A	U11B/U11C

4.4. USB-C, SIM and Antenna Interfaces

Interface	Function
USB Type-C	USB 2.0: diagnostics, parameters, stored records, configuration and local firmware update
SIM / eSIM	Physical SIM or embedded SIM/eSIM with automatic failover
GSM antenna	External SMA antenna connector

5. Specifications

5.1. Recommended Operating Conditions

Parameter	Min	Typ	Max	Unit
POWER SUPPLY				
Supply voltage	10.8	12	13.2	V DC
Supply current	—	—	500	mA
Power consumption	—	—	6	W
ENVIRONMENTAL CONDITIONS				
Operating temperature	−30	—	+70	°C
Relative humidity	0	—	93	% RH
Ingress protection	—	IP40	—	
Impact protection	—	IK06	—	
TIMEKEEPING				
RTC accuracy at nominal temperature	—	—	±0.5	s/day

5.2. Cellular and Network Characteristics

Parameter	Value
Cellular modes	4G LTE Cat 1 / 2G GPRS-EDGE, automatic 4G→2G fallback
LTE bands	B1 / B3 / B5 / B7 / B8 / B20
GSM bands	900 / 1800 MHz
LTE Cat 1 peak rates	10 Mbps downlink / 5 Mbps uplink
IP stack	TCP/IP, IPv4 and IPv6

5.3. Smart Meter Interface and Readout

Parameter	Value
Primary meter protocol	IEC 62056-21 Mode C
Additional library	DLMS/COSEM (library support; meter-specific integration)
Meter capacity	10+ smart meters per gateway
RS485 ports	1 or 2 independent ports depending on model
Maximum baud rate	115,200 baud
Meter operations	Readout, profile requests, OBIS, discovery/rescan

5.4. Data Management and Scheduling

Parameter	Value
Scheduling	CRON schedules, directives and execute jobs
Head-End interface	MQTT 5.0, TCP/IP, identification and heartbeat
Reliability controls	Application ACK / retry handling
Offline storage	External NOR Flash; continues scheduled collection while offline
Store-and-forward	Automatic replay after reconnection, within available memory capacity
Data memory	128 MB assembled; 32/64 MB optional
Log and alarm retention	90 days
Alarms and logging	Event logging, alarms, timestamped records

Note: Data retention depends on record sizes, schedules, memory allocation and retry policies.

5.5. Secure Communication and Cryptography

Parameter	Value
Secure transport	MQTT over TLS 1.3
Payload encryption	AES-256 (request-selected)
Key agreement	ECDHE
Compression	LZ (request-selected)
Response processing	Uses encryption/compression modes identified in request header
Access control	IP whitelist and authorized-client checks

5.6. Firmware and Local Device Management

Parameter	Value
Remote firmware updates	FOTA / OTA over cellular network
Recovery rollback	Return to previously working firmware version
Local service links	USB Type-C / RS485
Mobile application	Read parameters, logs, alarms and stored records; configure and update
Microcontroller security	TrustZone-capable MCU hardware platform

Note: TrustZone capability refers to hardware; it does not imply enabled secure boot or isolated-key services.

5.7. Front-Panel Indicators

Parameter	Value
POWER	Power / supply indication
SIGNAL ×3	Three-level cellular signal strength
GSM / NET	4G / 2G communication mode
IP	IP address acquisition
RS485 (I)	Serial communication activity
RS485 (II) / RELAY	Second RS485 activity or relay state (model-dependent)

5.8. Testing and Certification Documentation

Parameter	Value
Environmental	EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-31
Mechanical and ingress	EN 62262; IEC 60529
Safety	EN IEC 62368-1
Materials	IEC 60695-11-10
Electromagnetic compatibility	EN 55032; EN 55035
Timing control	EN 62054-21

Note: The listed standards identify the available testing/documentation scope; certificate numbers and laboratory identifiers are provided in the corresponding issued reports. CE and RED conformity declarations are not claimed in this datasheet.

6. Model Configurations and Ordering Information

Model	RS485	Relay	Backup energy	NOR Flash
VIOT-U11B-128	1	1	Rechargeable battery	128 MB
VIOT-U11C-128	1	1	2 × 10 F supercapacitors	128 MB
VIOT-U20C-128	2	—	2 × 10 F supercapacitors	128 MB
VIOT-U10C-128	1	—	2 × 10 F supercapacitors	128 MB

6.1. Product Code Structure

VIOT-U11B-XXX

Code field	Meaning / options
VIOT	ViPulse IoT product family
U	Product series (fixed code)
First digit	Number of RS485 ports: 1 or 2
Second digit	Number of relay outputs: 0 or 1
B / C	Backup energy: B = Battery; C = Supercapacitor
XXX	NOR Flash: 032 = 32 MB; 064 = 64 MB; 128 = 128 MB

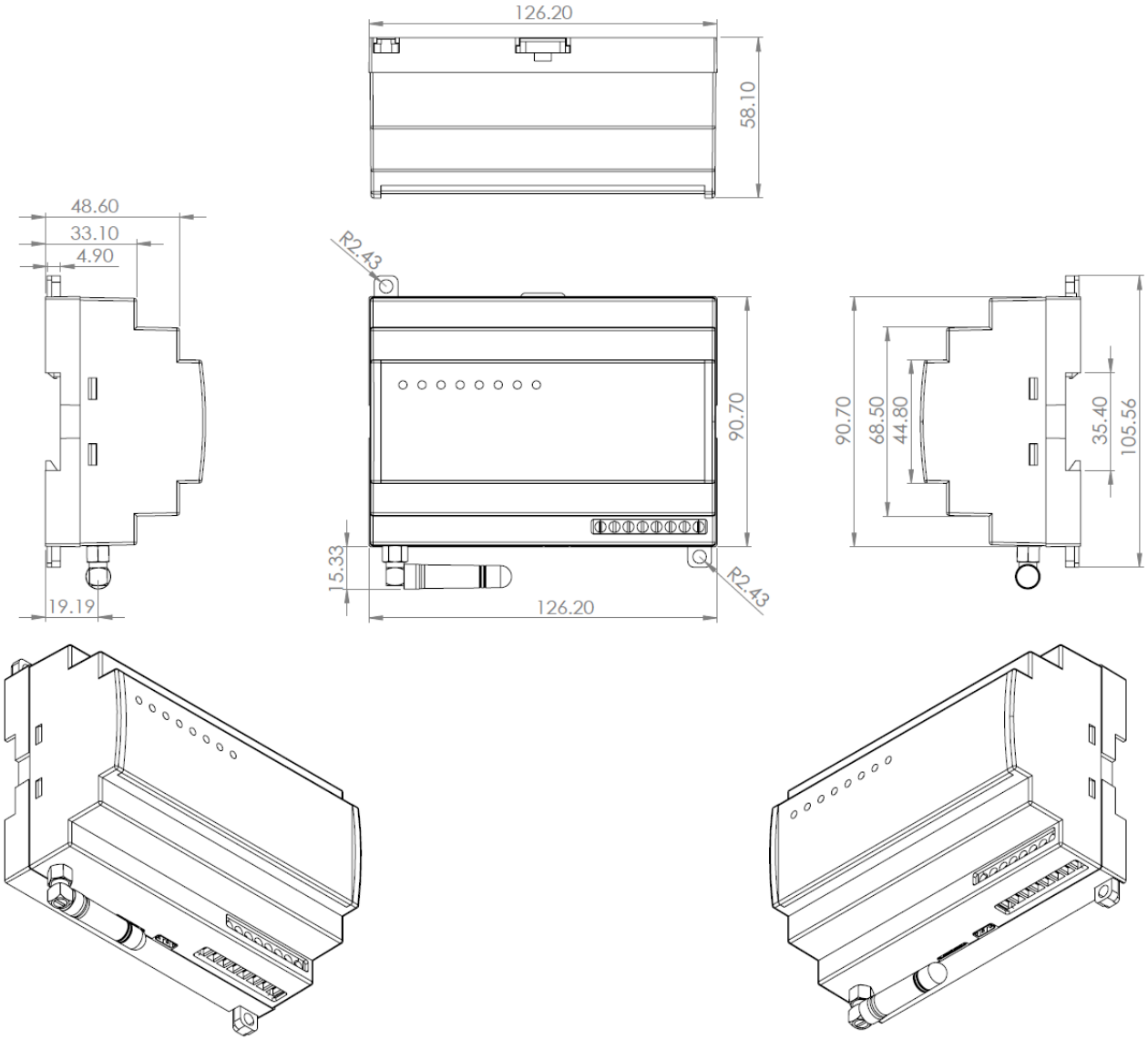
Example: VIOT-U11B-064 = 1 RS485, 1 relay, battery backup and 64 MB NOR Flash. Current assembled models use 128 MB.

Configuration	32 MB	64 MB	128 MB (assembled)
Battery + relay	VIOT-U11B-032	VIOT-U11B-064	VIOT-U11B-128
Supercap + relay	VIOT-U11C-032	VIOT-U11C-064	VIOT-U11C-128
Dual RS485	VIOT-U20C-032	VIOT-U20C-064	VIOT-U20C-128
Base model	VIOT-U10C-032	VIOT-U10C-064	VIOT-U10C-128

Note: 32/64 MB are order-specific BOM options and require no PCB redesign.

7. Technical Drawings and Product Visuals

7.1. Dimensional Drawing



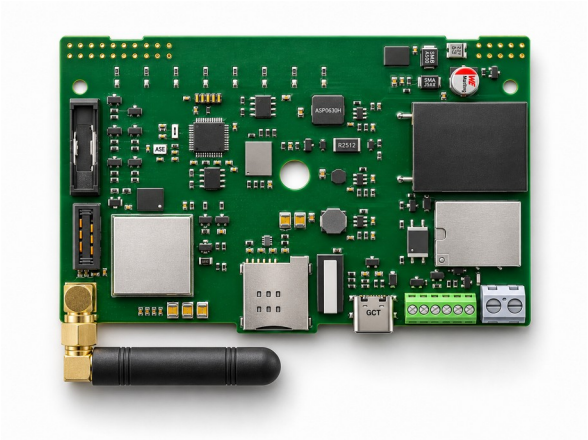
Note: All dimensions are shown in millimeters.

7.2. Product Visuals

The following product visuals show the VIOT PCB assembly and the component-side layout.



Perspective board view



Top-side PCB view